Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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OPTICAL TIME DOMAIN REFLECTOMETER

MW9070B

1.31/1.55 µm (SM), 0.85/1.3 µm (GI)

The MW9070B is a high-performance mini-OTDR for installation and maintenance of subscriber fiber optic lines and other fiber optic cables. It automatically detects the positions of faults in the cable, and displays an event table listing faults, and a trace waveform. Despite the large 7" screen, the high-performance mini-OTDR is just the size of a B5 file and it weighs in at only 3.2 kg.
The MW9070B is designed with a wide dynamic range and short dead zone, and is indispensable for detecting faults in optical trunk lines, subscriber lines, optical CATV cables, optical LANs, and other types of fiber optic cables. In addition, it is also invaluable in measuring transmission line losses, connection losses, return loss and other parameters. Six optical units are available depending on the wavelength and type of optical fiber, making the MW9070B an economic choice for a wide range of applications.

Features

- Compact (smaller than footprint), lightweight (3.2 kg)
- Simple operation with automated fault measurement
- Simultaneous waveform trace and event table display on large LCD
- Built-in 3.5-inch FDD (optional)
- Wide-dynamic range: 36/34 dB (MW0970B/0972B)
- Short dead zone (MW0970B/0972B): 5 m (Event), 25 m (Attenuation)
- High-speed real-time sweep to check fiber connections
- Manual operation for novice and experienced operators
- Visual LD Light Source (option for units)
- Emulation software runs on any personal computer under Microsoft Windows environment (sold separately)

Functions and performance

- **Easy operation and fully-automated measurements**

In the fully-automatic mode (FULL AUTO), simply pressing the Start key sets the optimum distance range, pulse width and averaging processing for the optical fiber cable being measured, and automatically detects the positions of any faults.
Furthermore, the real-time sweep function can be used to update the waveform at 0.4 s sweep (MW0970B/0972B), to confirm the status of the connected fiber cable in real-time, so trouble from loose connectors can be prevented in advance.

- **Event registration**

Events (splices, far end, and breaks) in each fiber of a multifiber optical may sometimes occur at the same position. Consequently events in the first cable that are not detected at the threshold set previously in the event table are registered on a second fiber when using fully automatic mode. These events can be added to the table using the event addition function and then events are set to the Fixed Mode. Next, when the measurement fiber is changed and the start key pressed, all of the target events of the second and subsequent fibers are measured repeatedly and efficiently.

- **Automatic optical connector connection status check**

This function checks the status of the connection between the optical connector and the mini-OTDR. It automatically detects whether or not there are any problems with the connector, such as dirt in the connector or a poor fit. It then outputs an alarm.

- **MX3607B OTDR Emulation Software**

Data measured by the MW9070B can be downloaded to a personal computer, analyzed in detail in the Microsoft Windows environment, and compared with previously-recorded waveforms using the MX3607B OTDR Emulation Software. (For details, please refer to the MX3607B data sheet.)

- **0.01 dB threshold**

At periodic inspection of optical fiber cables, it is necessary to check increases in connection loss due to aging. The loss level that must not be exceeded as a result of aging can be called the threshold level. The MW9070B allows the threshold to be set anywhere from 0.01 dB to a maximum 9 dB in 0.01 dB increments.

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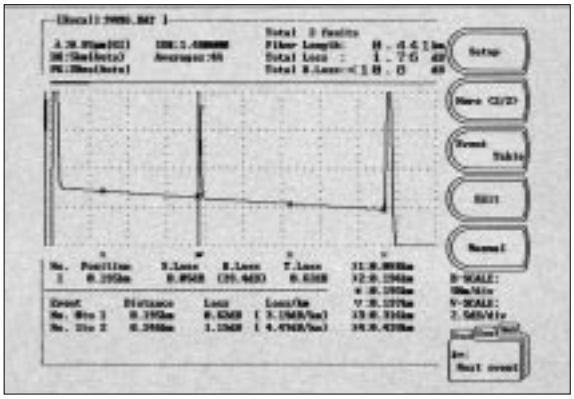


Detection of 0.05 dB loss event using 0.01 dB threshold

- **Event editing**

In fully automatic measurement, splice points with levels below 0.01 dB but which are not judged faults can be added to the event table, events which were mistakenly determined to be faults due to noise can be removed, and the events points can be moved and set to their correct positions. In addition, both ends of the cable can be specified on the trace waveform (end-to-end registration). These event editing functions can be used to modify results to produce accurate measurement data. An asterisk is appended to edited events to discriminate them from other events.

- **Saving and printing data**

In addition to internal RAM, data can also be saved in memory cards and on floppy disks. All saved waveforms can be printed at once, or only selected files can be printed continuously.

Number of saved screens

Medium	Internal RAM	Memory card (1 MB)	Floppy disk (2HD, 1.44 MB)
Number of screens	170	280	400

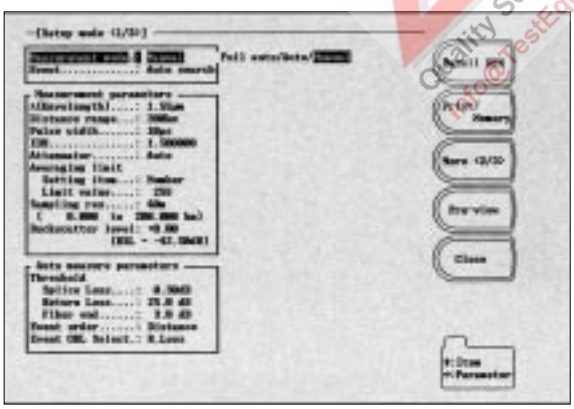
Note: The number of screens are for reference only.

- **Setup screen**

When the power is turned on, the <1/3> to <3/3> setup screen is displayed.

Setup screen <1/3>

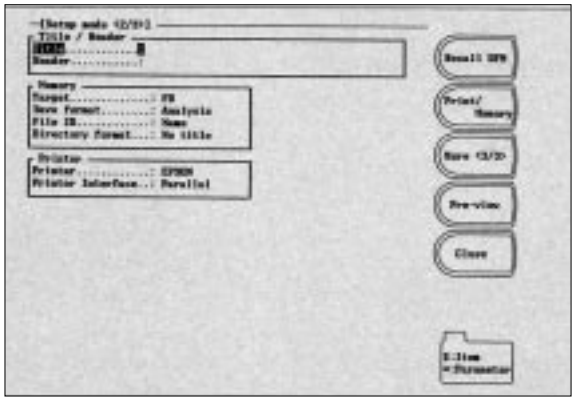
When the measurement mode is set to the fully automatic mode, the optimum distance range, pulse width, and number of averaging times are set automatically. After averaging, fault positions are detected automatically.



Setup screen <1/3>

Setup screen <2/3>: Print mode and analysis mode

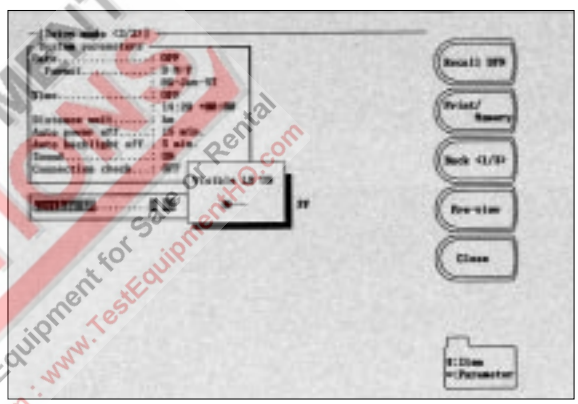
When saving measurement results in memory, the print mode can be selected to increase the number of screens that can be saved. Files saved in the print mode can be printed but cannot be viewed in the zoom mode or otherwise analyzed in detail. If data analysis is necessary, files should be saved in the analysis mode.



Setup screen <2/3>

Setup screen <3/3>: Automatic backlighting off, automatic power off

The MW9070B can be set so that the backlighting and power are turned off automatically if no panel operations are performed within a fixed period of time, helping to save power and permit use over longer periods of time. In this case, the displayed waveform immediately before auto power-off is backed-up automatically.

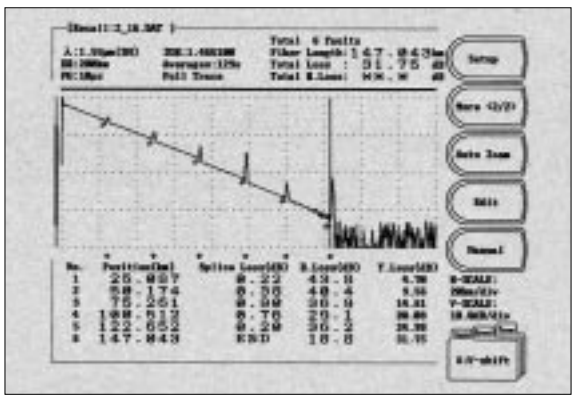


Setup screen <3/3>

- **Function for saving settings**

Parameters entered from the setup screen <1/3> can be saved in dedicated DFN memory. Even after using the panel to change measurement parameters, saved settings can be recalled to return the MW9070B to its previous setting state.

- **Long-distance fiber measurements using wide dynamic range unit**



Measurement approx. 147 km single-mode fiber

- **Visible LD light source (optical unit: Option 05)**

In OTDR measurements, there are some regions (dead zones) where faults cannot be observed. It is particularly difficult to detect faults in the dead zone at near end of a fiber cable. A visible LD light source emitting visible light at 635 nm is connected to the fiber, so the position where light is leaking from a fault (break, bend) can be determined. This can also be used for core identification in fibers.

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Specifications

• MW9070B (main frame)

Display		640 x 480 dot semi-transparent LCD, 7-inch (with backlight on/off function)
Interface		Serial: RS-232C, 1 port (D-sub 9P connector) Printer: 8 bit parallel (Centronics, D-sub 25P connector) Keyboard: For IBM US English keyboard (101 keys), DIN 5P
Waveform storage		Internal memory (battery back-up), memory card slot: 1 (memory card slot conforms to PCMCIA R1.0 standard), 3.5-inch FDD: 1 (option), saves GR-196-CORE format files*1
Calendar clock		Displays year, month, day, hour, minute (battery back-up, on/off display)
Auto measurements	Measurement items	Event distance, loss, return loss, loss from near end, and total return loss
	Threshold	Connection loss: 0.01 to 9 dB (in 0.01 dB steps) Return loss: 20 to 60 dB (in 1 dB steps) Fiber end: 1 to 10 dB (in 1 dB steps)
	No. of detection points	99 max.
	Automatic setting items	Pulse width, distance range, averaging times
	Event registration function	Event points are registered, and the loss, return loss, etc. for these points are measured and used to create an event table
	Connection check	On/off switchable
Manual measurements		Real-time sweeping, point-to-point distance/loss measurements, point-to-point loss measurements per unit length, return loss measurements, splice/connection loss measurements and total return loss
Distance unit		m, km, ft, kft, mi
Relative distance measurement		Zero cursor settable
Functions*1		Waveform comparison: Dual or difference waveform display Variable sampling resolution: Switchable from 1 to 40 m Shortcut keys: Save, recall, print, switch waveform Ghost detection: Moves marker to ghost Fresnel reflection and indicates ghost events with ghost marker
Keyboard input		Allows input of file names, titles, headers and event comments
IOR		1.400000 to 1.699999 (in 0.000001 steps)
Title input		32 characters max. (Title Auto-increment*1)
Power supply		Battery: MZ5018A Battery Pack (sold separately), MZ5020A Dry-cell Battery Pack (sold separately) DC input: 10 to 18 V/14 W AC input: 90 to 250 V, 50/60 Hz, 50 VA (with SWA1702W AC Adapter: standard accessory)
Dimensions and mass		290 (W) x 194 (H) x 75 (D) mm, ≤3.2 kg (including optical unit and MZ5018A Battery Pack)
Environmental conditions*2		Temperature: –10˚ to +40˚C (operate), –20˚ to +60˚C (storage) Humidity: 85% (operate and storage) Vibration: Conforms to MIL-T-28800E (Class 3) Shock: Height 76 cm, 6 surfaces, 8 corners EMI: CISPR Pub 22 (Class A) Dustproofing: MIL-T-28800E Water-proofing: MIL-T-28800E
EMC*3		EN55011 (1991, Group 1, Class A), EN50082-1 (1992)
Safety		EN61010-1: 1993 (Installation Category II, Pollution Degree II)

⋆1: Only software version 3.0 and later.
⋆2: Not applied to AC adapter. When using memory card, limited by memory card's specifications.
⋆3: Electromagnetic Compatibility

• MW0970A/B, MW0972A/B, MW0973J, MW0975J Optical Units
(all typical values are given for reference only to assist in the use the unit, and are not guaranteed specifications.)

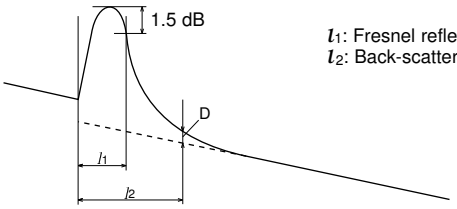
Model		MW0970A	MW0970B	MW0972A	MW0972B
Fiber		10/125 µm SM fiber ⋆ITU-T G.652			
Center wavelength		1310 ±30 nm*1	1310 ±30 nm*1 (typical: ±15 nm)	1310/1550 ±30 nm*1	1310/1550 ±30 nm*1 (typical: ±15/20 nm)
Optical connector		FC, ST, DIN, SC, DIAMOND (HMS-10/A)*2 ⋆Replaceable and cleanable (all PC type)			
Distance range (km)		5, 10, 25, 50, 100, 200 (200 km is added to only MW0970B/0972B)			
Pulse width (ns)		20, 50, 100, 500, 1000, 2000, 4000, 10000 (4000/10000 ns are added to only MW0970B/0972B)			
Dynamic range (S/N=1)		23 dB at 1.31 µm*3 (typical: 25.5 dB)	36 dB*4	23 dB at 1.31 µm*3 (typical: 25.5 dB), 20.5 dB at 1.55 µm*3 (typical: 22.5 dB)	36 dB at 1.31 µm*4 34 dB at 1.55 µm*4
Measurement range*5		15.5 dB at 1.31 µm*3 (typical: 18 dB)	22 dB*6 (typical: 25 dB)	15.5 dB at 1.31 µm*3 (typical: 18 dB), 13 dB at 1.55 µm*3 (typical: 15 dB)	22 dB at 1.31 µm*6 (typical: 25 dB), 20 dB at 1.55 µm*6 (typical: 23 dB)
Dead zone	Fresnel reflection	10 m*7	5 m	10 m*7	5 m
	Back-scattered light	50 m*7	25 m*8	50 m*7	25 m*8
Marker-resolution		1 m (at 5 km range)			
Accuracy		Distance measurements: ±2 m ± (10^{-4} x distance) ±marker resolution ⋆Excluding uncertainly caused by fiber IOR Loss measurements (linearity): ±0.05 dB/dB or 0.1 dB (whichever greater) Return loss measurements: ±4 dB			

Continued on next page

Model	MW0970A	MW0970B	MW0972A	MW0972B
Measurement time*9	180 s max. (auto-measurement mode)			
Real-time sweep	0.9 s*10	0.4 s*10	0.9 s*10	0.4 s*10
Dimensions	290 (W) x 120 (H) x 35 (D) mm			
Safety	Laser: 21CFR Class 1, IEC Class 1			
Environmental conditions	Same as mainframe			
EMC	Same as mainframe			

Model		MW0973J	MW0975J
Fiber		62.5/125 µm multimode fiber*1	
Center wavelength		850 ±30 nm*12	850/1300 ±30 nm*12 (typical: ±20 nm)
Optical connector		FC, ST, DIN, SC, DIAMOND (HFS-13/A)*13 ⋆Replaceable and cleanable (all PC type)	
Distance range (km)		5, 10, 25, 50, 100	
Pulse width (ns)		20, 50, 100, 500 (500 ns is added to only 1300 nm wavelength)	
Dynamic range (S/N=1)		18 dB*14	18 dB at 0.85 µm*14 (typical: 22 dB), 22 dB at 1.3 µm*15
Measurement range*5		10 dB*14	10 dB*14, 14 dB*15
Dead zone	Fresnel reflection	6 m*16, *17	6 m at 0.85 µm*16, *17(typical: 5 m*18), 8 m at 1.3 µm*16, *17(typical: 6 m*18)
	Back-scattered light	15 m*16, *17	50 m*16(at 0.85/1.3 µm, D=±0.1 dB), 15 m*16 (at 0.85 µm, D=±0.5 dB, typical: 9 m*18), 20 m*16 (at 1.3 µm, D=±0.5 dB, typical: 13 m*18)
Marker-resolution		1 m (at 5 km range)	
Accuracy		Distance measurements: ±2 m ± (10^{-4} x distance) ±marker resolution ⋆Excluding uncertainly caused by fiber IOR Loss measurements (linearity): ±0.05 dB/dB or 0.1 dB (whichever greater) Return loss measurements: ±4 dB	
Measurement time*9		180 s max. (auto-measurement mode)	
Real-time sweep		1.0 s*19	
Dimensions		290 (W) x 120 (H) x 35 (D) mm	
Safety		Laser: 21CFR Class 1, IEC Class 1	
Environmental conditions		Same as mainframe	
EMC		Same as mainframe	

⋆1: Pulse width of 1 µs at 25˚C
⋆2: One of these connectors is attached. D4 and Biconic connectors are factory options (not user replaceable)
⋆3: Pulse width of 2000 ns during auto-measurement
⋆4: Pulse width of 10 µs at 25˚C
⋆5: 0.5 dB splice detectable range with ±0.1 dB accuracy (test method of optical unit for SM fiber depends on Bellcore TR-NWT-001138)
⋆6: Pulse width of 4 µs during auto-measurement
⋆7: At ≥25 dB return loss with 20 ns pulse width
⋆8: At ≥40 dB return loss with 20 ns pulse width
⋆9: Measurement time is the period from when the start key is pressed until the measurement results is displayed in the displayed in the table with full-auto mode. This time changes according to the fiber loss, pulse width, and level of Fresnel reflection, and to whether or not distance range and pulse width are set to Auto. The typical measurement time is 45 seconds when measuring a 5 km fiber (0.35 dB/km loss) at a wavelength of 1.31 µm with distance range and pulse width to set Auto.
⋆10: For loss measurements (2 point method) of 25 km fiber, the 50 km distance range and displayed with full scale (5 km/div).
⋆11: When used with 50/125 µm fiber, the dynamic range is decreased by approx. 4 dB, and the dead zone (defined using 0.5 dB back-scattered light) will increase to approx. 20 m at 850 nm, and 30 m at 1300 nm.
⋆12: Pulse width of 100 ns at 25˚C
⋆13: One of these connectors is attached. D4, Biconic and Amphenol 906 connectors are factory options (not user replaceable).
⋆14: 100 ns pulse width during auto-measurement
⋆15: 500 ns pulse width during auto-measurement
⋆16: Refer to the figure below



l_1: Fresnel reflection
l_2: Back-scattered light

⋆17: At ≥20 dB return loss with 20 ns pulse width
⋆18: Typical value at ≥30 dB return loss
⋆19: For loss measurements (2 point method) of 2 km fiber, the 5 km distance range and displayed with full scale (500 m/div).

• MW9070B Option 01: Built-in 3.5-inch FDD

Storage media	3.5” FD (2DD, 2HD)
Format	MS-DOS
Capacity	2DD: 720 KB, 2HD: 1.44 MB
File copying	Between FD, memory card and internal memory
Operating temperature	+5˚ to +40˚C
Operating humidity	≤80%
Operating conditions	Horizontal or tilted
Mass	≤300 g

• MW9070B Option 02: Monitoring function

Form	Installed in MW9070B Optical Time Domain Reflectometer
Functions	Detects optical fiber faults (quick scan, normal scan, and near-end scan), scheduler, modem/communication setting, controls alarm generator and optical switch (eight ports for optical switches and alarm generator)
Installation program	Functions Reads and records files, sets OTDR measurement conditions, executes OTDR measurement, reads OTDR waveform, manipulates waveform, sets optical switches and alarm ports, sets OTDR modem, select reference data type, sets fault threshold value, sets evaluation range, saves reference data, creates/downloads/executes scheduler, sets serial port/modem, connects/disconnects network Operating requirements Computer: i486™ or higher processor (Pentium 75 MHz or higher recommended) running Windows95 Memory required: 16 MB or more (32 MB or more recommended) Hard disk required: 16 MB or more free space (20 MB or more recommended) FDD: 3.5” (1.44 MB) x 1 drive Display: 800 x 600 or higher resolution color monitor Mouse RS-232C: 1 port or more

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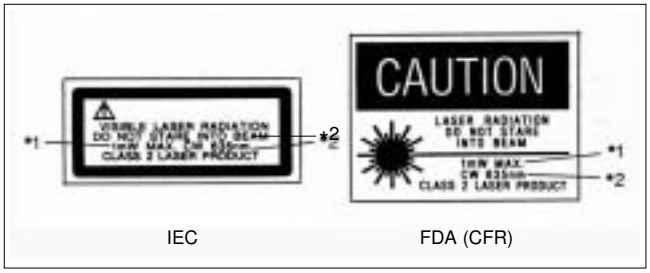
• Optical units Option 05: Visual LD light source

Wavelength	635 nm ±10 nm at 25˚C
Output	–3.0 ±1.5 dBm (blinks at constant intervals*1)
Output fiber	10/125 µm, SM fiber
Optical connector	FC, SC, ST, DIN, Diamond (user replaceable), D4, Biconic (factory option)
Optical safety	IEC 825 Class 2, FDA (21CFR 1040.10) Class 2
Environmental conditions	See respective units

*1: Only software version 3.0 and later

Safety measures for laser products
This option complies with the optical safety standards in Class 2 of the IEC pub. 825 and the FDA (21CFR 1040.10, USA); the following descriptive labels are affixed to the product (FDA label is only affixed to product for export to the USA).



IEC FDA (CFR)

The maximum output is indicated under *1, and the wavelength under *2.
Caution: Do not look directly into the laser beam.

• MZ5018A Battery Pack

Power, capacity	10.8 V, 2.8 AH (nominal value)
Type	Ni-Cd secondary cell
Charging time	14 hours (at 25˚C using SWA1702W AC adapter)
Temperature range when charging	0˚ to +40˚C
Drive time	≥5 hours (at 25˚C with backlight off)
Dimensions	290 (W) x 74 (H) x 35 (D) mm

• MZ5020A Dry-cell Battery Pack

Batteries	Ten C/BABY-size alkaline or manganese (LR14, R14) dry cells (provided by user)
Life*1	4 hours (backlight on), 13 hours (backlight off)
Ambient temperature	Same as main frame
Dimensions and mass	290 (W) x 74 (H) x 35 (D) mm, ≤450 g (excluding batteries)

*1: Typical continuous at room temperature using LR14 dry cells

• SWA1702W AC adapter (Tamura Corporation)

AC input	90 to 250 Vac, 50/60 Hz
DC output	17.5 Vdc, 1.2 A
Dimensions	163 (W) x 36 (H) x 63 (D) mm
Safety standards	UL1950, CSA1402C, EN60-950
Temperature	0˚ to +40˚C (operate), –10˚ to +70˚C (storage)
Humidity	90% (operate), 95% (storage)

• MX3607B OTDR Emulation Software

Functions*1	Waveform display, manual measurement, auto search, auto zoom, event editing, continuous printing, waveform comparison, waveform difference, both ends measurement, multi-waveform display, text output
Operating environment	Personal computer: i486™ or higher processor, and capable of running Microsoft Windows 3.1 or Windows 95 OS: Microsoft Windows 3.1 or Windows 95 Memory required: 8 MB to run this program Hard disk required: At least 5 MB of free disk space FDD: 3.5" (1.44 MB) x 1 drive Display: 640 x 480 dots or higher resolution color monitor Others: Mouse or other pointing device

*1: Supported in MX3607B version 2.0 or later

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name	
	Main frame	
MW9070B	Optical Time Domain Reflectometer	
	Standard accessories (main frame)	
SWA1702W	AC adapter (Tamura Corporation):	1 pc
	Power cord, 2.5 m:	1 pc
	Short-cut label:	1 copy
W1046AE	MW9070B operation manual:	1 copy
W1047AE	MW9070B serial interface manual:	1 copy
W1046BE	MW9070B service manual:	1 copy
	Optical units	
MW0970A	SMF 1.31 µm Unit (economy type)	
MW0970B	SMF 1.31 µm Unit (wide-dynamic range type)	
MW0972A	SMF 1.31/1.55 µm Unit (economy type)	
MW0972B	SMF 1.31/1.55 µm Unit (wide-dynamic range type)	
MW0973J	GIF 0.85 µm Unit	
MW0975J	GIF 0.85/1.3 µm Unit	
	Standard accessory (optical unit)	
	Replaceable optical connector*1:	1 pc
	Battery pack	
MZ5018A	Battery Pack (Ni-cd secondary cell)	
MZ5020A	Dry-cell Battery Pack [Ten C/BABY size alkaline or manganese (LR14, R14) dry cells (provided by user)]	
	Application software	
MX3607B	OTDR Emulation Software Supplied on 3.5" FD (2HD), includes setup program	
	Standard accessory for MX3607B	
W1058AE	MX3607B operation manual:	1 copy
	Options (main frame)	
MW9070B-01	3.5-inch FDD	
MW9070B-02	Monitoring function	
MW9070B-10	English language display*2	
MW9070B-12	German language display*2	
MW9070B-13	French language display*2	
MW9070B-14	Italian language display*2	
MW9070B-15	Spanish language display*2	
MW9070B-17	Japanese language display*2	
MW9070B-18	Chinese language display*2	
MW9070B-19	Finnish language display*2	
	Options (optical unit)	
MW0970A-05	Visible LD light source for MW0970A*3 (factory option)	
MW0970B-05	Visible LD light source for MW0970B*3 (factory option)	
MW0972A-05	Visible LD light source for MW0972A*3 (factory option)	
MW0972B-05	Visible LD light source for MW0972B*3 (factory option)	
MW0973J-05	Visible LD light source for MW0973J*3 (factory option)	
MW0975J-05	Visible LD light source for MW0975J*3 (factory option)	
MW0970A-21	D4 connector (factory option)	
MW0970B-21	D4 connector (factory option)	
MW0972A-21	D4 connector (factory option)	
MW0972B-21	D4 connector (factory option)	
MW0973J-21	D4 connector (factory option)	
MW0975J-21	D4 connector (factory option)	
MW0970A-22	Biconic (AT&T) connector (factory option)	
MW0970B-22	Biconic (AT&T) connector (factory option)	
MW0972A-22	Biconic (AT&T) connector (factory option)	
MW0972B-22	Biconic (AT&T) connector (factory option)	
MW0973J-22	Biconic (AT&T) connector (factory option)	
MW0975J-22	Biconic (AT&T) connector (factory option)	
MW0973J-23	Amphenol 906 connector*4 (factory option)	
MW0975J-23	Amphenol 906 connector*4 (factory option)	

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Quality Second User Test Equipment for the Rest of the World
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Model/Order No.	Name
MW0970A-38	ST connector (user replaceable)
MW0970B-38	ST connector (user replaceable)
MW0972A-38	ST connector (user replaceable)
MW0972B-38	ST connector (user replaceable)
MW0973J-38	ST connector (user replaceable)
MW0975J-38	ST connector (user replaceable)
MW0970A-39	DIN connector (user replaceable)
MW0970B-39	DIN connector (user replaceable)
MW0972A-39	DIN connector (user replaceable)
MW0972B-39	DIN connector (user replaceable)
MW0973J-39	DIN connector (user replaceable)
MW0975J-39	DIN connector (user replaceable)
MW0970A-40	SC connector (user replaceable)
MW0970B-40	SC connector (user replaceable)
MW0972A-40	SC connector (user replaceable)
MW0972B-40	SC connector (user replaceable)
MW0973J-40	SC connector (user replaceable)
MW0975J-40	SC connector (user replaceable)
MW0973J-42	DIAMOND (HFS-13/A) connector (user replaceable)
MW0975J-42	DIAMOND (HFS-13/A) connector (user replaceable)
MW0970A-43	DIAMOND (HMS-10/A) connector (user replaceable)
MW0970B-43	DIAMOND (HMS-10/A) connector (user replaceable)
MW0972A-43	DIAMOND (HMS-10/A) connector (user replaceable)
MW0972B-43	DIAMOND (HMS-10/A) connector (user replaceable)
MW0970A-45	FC connector (user replaceable)
MW0970B-45	FC connector (user replaceable)
MW0972A-45	FC connector (user replaceable)
MW0972B-45	FC connector (user replaceable)
MW0973J-45	FC connector (user replaceable)
MW0975J-45	FC connector (user replaceable)
	Optional accessories
Z0301A	Keyboard
JS256G3-C-13	256 KB memory card (conforms to PCMCIA R1.0)
JS512G3-C-13	512 KB memory card (conforms to PCMCIA R1.0)
JS1024G3-C-13	1024 KB memory card (conforms to PCMCIA R1.0)
JS2048G3-C-13	2048 KB memory card (conforms to PCMCIA R1.0)
FC-AP	Adapter
J0635[ ]*5	Optical fiber cable (with FC-PC at both ends, SM)
MZ8012A	Connector Cleaning Set
Z0242	Soft carrying bag
Z0243	Hard carrying case (holds main frame and thermal printer)
J0617B	Replaceable optical connector (FC)
J0618D	Replaceable optical connector (ST)
J0618E	Replaceable optical connector (DIN)
J0618F	Replaceable optical connector (HMS-10/A, HFS-13/A)
J0619B	Replaceable optical connector (SC)
J0699[ ]*5	FDDI-FC conversion cord
J0700[ ]*5	FDDI-ST conversion cord
J0701[ ]*5	FDDI-SC conversion cord
J0654A	Serial interface cable (for remote control with IBM-PC/AT or J-3100)
J0661A	Serial interface cable (for connection with peripherals)
	Peripherals
DPU-411-21BU	Thermal printer (120 V ±10%, 60 Hz, 0˚ to +40˚C, Seiko Instruments Inc., printer cable sold separately)
DPU-411-21BE	Thermal printer (220 V ±10%, 50 Hz, 0˚ to +40˚C, Seiko Instruments Inc., printer cable sold separately)
J0614	Printer connection cable (parallel)
	Supplies
TP411-28CL	Printer paper for DPU-411-21BU/BE (10 rolls/set)

⋆1: Specify one of FC, ST, DIN, SC or DIAMOND. When the connector type is not specified, FC is supplied.
⋆2: If the display language is not specified, the English version is installed.
⋆3: Supplied with same connector as optical unit.
⋆4: FC type and dead zone is varied.
⋆5: Specify the optical fiber length as A, B, or C (A: 1 m, B: 2 m, C: 3 m).

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